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ABSTRACT

This document explores the changing U.S. office, from its expansion in the 1830s due to the railroad industry to its dominance in the U.S. economy of the late 20th century. This examination of the office provides a way to study the U.S.' growth from the industrial revolution to the information age. Chapter 1 provides a brief historical overview of the origin and growth of the U.S. office. Management issues, scientific management, and the post war economy highlight historical developments of the office. Along with copiers, chapter 2 focuses on the office machines of the typewriter and the computer from the origins of each to the transition from the typewriter to the computer. The issue of office organization and the status of workers in chapter 3 represents visually and physically the intangible relations of power and authority in the office. Following a description of office workers in chapter 4, chapter 5 discusses office trends of the high security office, new technology, the global office, the portable office, the home office, and future developments. Fifteen poster illustrations of different types of offices and subjects to be used with classroom activities accompany the text. (CK)

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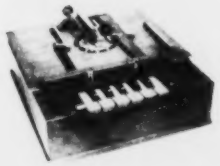
CARBONS TO COMPUTERS

The Changing American Office



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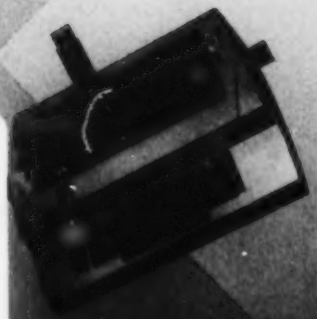

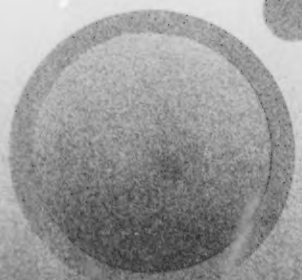

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CARBONS TO COMPUTERS

The Changing American Office

Michelle Smith

educational consultants Kathryn Turman, Janice Majewski, and Thomas Lowderbaugh

Developed by the Office of Elementary and Secondary Education, Smithsonian Institution, Ann Bay, Director

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SMITHSONIAN INSTITUTION

Washington, D.C.

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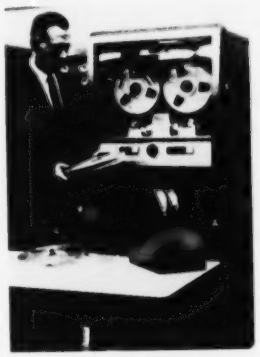
Why Study Offices?

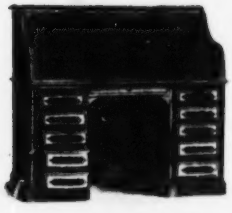
Modern American offices are not just a collection of desks, chairs, and machines. Other than our homes, they are the places in which we spend most of our time. They are home to our talents, energies, and efforts—our work.

Offices reflect our society's values. They show that we care about efficiency and order but also power and authority. They reflect our beliefs about progress and high technology, but also competition and cooperation. Exploring the changing American office, from its beginnings in the 1830s in the railroad industry to its dominance in the American economy of the late twentieth century, shows us a way to study our nation's growth, from the industrial revolution to the postindustrial information age.

We study the remaining tools and weapons of ancient peoples to understand who they were and how they lived. Computers, typewriters, and calculators are the tools and weapons we use to wage the battles and do the work of our advanced society. In observing and recording their role in modern America we not only learn more about our own society but preserve our times for the students of the future.



A Short History of the Birth and Growth of the American Office



Rolltop desk, catalogue drawing. Smithsonian Institution

The locally oriented American economy of the early 1800s did not need offices as we know them today. Business was run then much as it had been run for half a millennium. Goods were made, transported, and sold. With the help of a few clerks, merchants ran their small companies as family businesses. Few differences distinguished the merchants in early nineteenth-century Boston from those in thirteenth-century Florence.

The early nineteenth-century merchant was his own importer, exporter, banker, wholesaler, retailer, and possibly shipowner. All businesses—even export businesses—were local. The merchant himself oversaw every aspect of his business, and his clerk posted his accounts in a ledger book or copied out his correspondence to a buyer. Even if he was a very successful merchant, or ran a large textile mill, he had no more than three men helping him with administrative tasks.

With the arrival of the railroad, however, the general merchant's business and the entire nature of American commerce changed forever. The railroad not only united the states, changed how and where we lived, and dramatically altered the country's image, it also transported goods almost anywhere. Suddenly, coal and the steam engine made it possible for business fortunes to increase as rapidly as they could be expanded westward. Using the railroad, local businessmen could do business nationally. And they could no longer do their business in their heads. Once the stakes for business increased, so did the logistics.

Railroads and the Birth of the Modern Office

If the small office of a textile merchant would be administratively overwhelmed by expanding trade, imagine the problems for the new railroad companies. For the first time in American business, the financial investment in an enterprise was too large for one owner or even for a small group of owners. Hardly a mom-and-pop company, the railroad was a multimillion-dollar corporation of stockholders and bankers that had to supervise hundreds of employees and its investment.

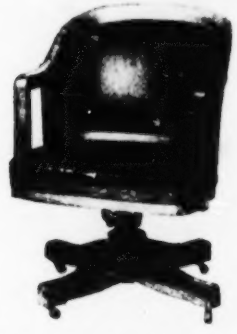
Railroads employed conductors, ticket sellers, engineers, construction workers, accountants, clerks, and payroll officers. Their employees were distributed across the country, serving the entire transportation network and offices along the way. Administering this corporation *profitably* meant developing not only an entirely new system of organization but also a vast interoffice communication system.

The stockholders and board members could not run the railroad's day-to-day operations. Instead, full-time employees were needed to make decisions and supervise the monies and staff necessary to keep the corporation profitable. The railroad needed men who were willing to and capable of acting like owners *for* the owners without any chance of ever being owners. The railroad

Key Points:

Basic components of an office system:

- A business too large to be run by one person
- An organized separation of functions (jobs), dictated by the number and complexity of tasks and employees required to run that business
- A hierarchy to establish the lines of authority governing the organization



Wooden office chair, Shea Smith & Company catalogue. Smithsonian Institution

needed *managers* just as much as it needed rails and boxcars and a reliable and safe transport system to sell. Coordinating the movement of people and goods, maintaining roundhouses, rail line, and stations, and making a profit were now the manager's job.

As demand for the railroads' services increased, more and more managerial employees were hired and a *hierarchy* of managers took its place on the corporate organizational chart. Owners and board members soon had little say in the operation of the railroads. They may have set fiscal policy, but their employees in offices throughout the country put the policy into practice and ran their company. By 1840 or 1850, management was a permanent part of the railroads' organization, and managers began to think of railroading as a lifelong career with chances for advancement. This was the beginning of modern business and its offices.

Mid-level managers oversaw central offices, supervising bookkeepers and clerks. These offices kept in close contact with each other by telegraph and daily mail carried by the trains. The mid-level managers reported to top managers, who reported to the board of directors.

By the 1880s, this organization and hierarchy would be duplicated by Western Union, the banking industry, and insurance companies. These businesses, like the railroads, were big, complex, geographically dispersed, and responsible for huge amounts of money not owned by one person or family. Their success was replicated by large manufacturers, importers, and chain stores. The railroads' administrative organizations had successfully proved that they could increase productivity, volume, and profits. Every other large business followed their example.

By the turn of the century, business administration was a profession. Harvard, Wharton, and the University of Chicago were already offering MBAs (master's degrees in business administration).

Management

Workers today take for granted the structuring of authority in the workplace. "Boss," "supervisor," "overseer," and "manager" are seen as interchangeable terms. We may think there were always bosses, certainly before the coming of the railroad. But for the purposes of this curriculum unit, it is important to see the *manager* as a historical development that can be dated to the 1830s.

Senior workers represented a familiar concept before that time. Agriculture had overseers; business had superior clerks. Some prosperous banks and insurance companies had men who were differentiated from other clerks by the trust and status their employers gave them. They supervised the work of one or two other clerks and often met clients.

But none of these highly regarded employees were true managers, because none of them could make business decisions for the owners. They had duties and responsibilities but not authority. They acted for the owner by directly fulfilling his wishes.

Key Points:

MANAGERS—
- Can be owners of a business but are usually paid employees who act *in place of* the owners
- Have autonomy and *authority* over other employees who are hierarchically ranked beneath them

SCIENTIFIC MANAGEMENT—
- Was developed by Frederick Taylor in the 1880s
- Separates thinking from doing
- Trains workers in specific labor processes rather than using their individual skills, talents, or inclinations
- Quantitatively measures production and sets time and performance standards for the labor process

The railroads, on the other hand, needed people to act in *place of* the owners and stockholders. When the railroads hired professionals to coordinate and control their business, to keep up with the railroad's day-to-day finances, these managers quickly took charge. They reinvented the system of keeping books and created departments to do the office work.

They introduced daily balance sheets and operating ratios, divided responsibilities among accounting offices, marketing offices, personnel offices, executive offices, and mailrooms. The clerical jobs in each of these different offices were specialized, reflecting the rational compartmentalization of the corporation. The managers had succeeded in creating a whole and functional organization out of thousands of parts and people.

Just as the conductors worked only with passengers on the trains, clerks in the receiving office worked only with incoming receipts. Clerks in the accounting office only posted entries in ledgers, and so forth.

By the 1890s, managers had so completely modernized business methods that they would have been more comfortable in today's offices than in the offices of the 1820s. By 1930, the organization and particularization of work was even further refined, in large part due to Frederick Taylor.

Scientific Management

Frederick Taylor began what was known as scientific management. In the 1880s, when most workers still labored in agriculture or factories rather than in offices, Taylor developed techniques in the steel industry that taught factory managers how to save money and increase productivity by making their employees more efficient. *How* the job was to be done was thought out by management; workers were mere instruments to execute the tasks.

Throughout the nineteenth century, as American capitalism built its industrial base, the factory system drew its labor force from the peasant and village cultures of Europe. The huge wave of immigrants who entered this country in the 1800s became the backbone of developing mass production.

Taylor's principles were meant to separate the worker from his old-world artisan culture—the idea that one person created an object, according to tradition and his own skill. The new order divided skills into a sequence of simple procedures to be taught to workers and monitored by management.

The rigidity and dehumanizing aspects of scientific management, from its beginning, engendered widespread working-class hostility. Nevertheless, it provided a general strategy which, in the long run, became the basic American approach to the structuring of labor processes.

Scientific management's success in industry led to its adoption in the office. Office managers knew too that time was money. Soon there were clerks who only opened letters all day, clerks who only typed, clerks who only filed, and couriers who picked up and delivered files from one person to the next. Typists did not take shorthand, and clerks who took shorthand (stenographers)

did not file. Theoretically, valuable company time was wasted when a stenographer left her desk to file.

As only one way was seen to do a job, individual approaches to tasks were discouraged. Standardization made it easy for managers to keep a close eye on all workers and work flow, counting the typists' strokes or the number of letters opened per hour. Offices were often open spaces, without partitions, where desks could easily be watched.

Workers were kept to their jobs, which they pursued in silence. They were not allowed to talk because conversation cut down work time. Some employers put partitions between desks to keep talking to a minimum, even though they then had to patrol the floors.

By the 1920s any real difference between some office work and the factory production line had disappeared. The office, like the factory, was tedious and stressful for the worker and closely monitored by the manager.

Why did people tolerate these working conditions? As America entered the Great Depression, people would do anything to keep their jobs.

Desks

The 1876 Centennial Exposition in Philadelphia, which engendered an explosion of new furniture ideas, led to dramatic changes in typical office equipment. Rolltop desks and filing systems were suddenly the rage.

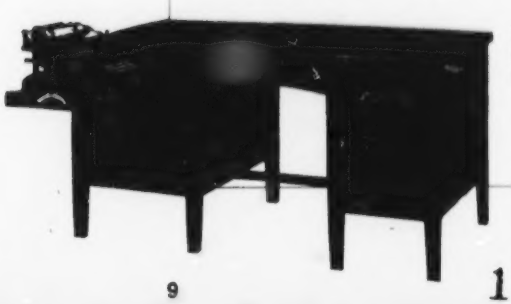
Businessmen were in the mood for a change. Improved housekeeping, they believed, must mean increased profits. A rolltop desk offered movable partitions, several sizes of pigeonhole cases, drawers, ledger cases, and a lock.

Typewriter desks went into the office with the typewriter. Some had cabinets built in that swung the typewriter out of sight as a writing surface swung up. Other typists' desks came in adjustable heights, allowing the typist to type standing as well as sitting.

By the 1890s, rolltops were becoming impractical. The office manager couldn't easily see what work his clerks were doing, and often too many papers were filed in their desks rather than in the filing cabinets. Soon rolltops were only managerial and executive furniture.

Office workers' desks became more and more streamlined as pigeonholes and filing slats were removed. By 1900, even the pedestals that supported the desk tops and provided storage space were replaced with legs, which made cleaning offices easier. Offices strove to be entirely standardized in appearance, for "efficiency." One desk, butted to another, was exactly like every other desk in the office.

Eventually, management considered wood inefficient and bad for employees' health, and metal desks became the standard by the 1920s. Wood now enjoys status as the material of choice for office desks, however, suggesting as it does, quality, success, and old-fashioned values.



Wooden office desk, Shea Smith & Company catalogue. Smithsonian Institution

Key Points:

- Scientific management gave way to ***human relations*** as businesses needed to make office work more attractive to workers
- The look of the office came to express *status*—that office work was done in a superior environment by superior people
- People's demands for working conditions that support and enhance their personal lives have caused management to respond with flexible personnel policies

Metal typewriter desk, Watson Mfg. Company catalogue. Smithsonian Institution

The Postwar Economy and the Office

When World War II ended, management and the office environment changed radically and quickly. Workers on the homefront, including many women who were filling in for the men at war, had essentially maintained the status quo during this period of national upheaval. But with the war over, American industry tooled up to satisfy pent-up demand for consumer goods after the long war years of scarcity. Factory jobs were paying far more for unskilled and semi-skilled labor than were office jobs.

Employers had to make office work more attractive. Instead of increasing clerical salaries, management emphasized the respectability or status of office work. Scientific management was modified to make jobs less routine, and the look of the office began to change to outwardly show this functional change.

Advertisements for jobs described "friendly" offices and bosses. Attractive health insurance and retirement plans became part of the financial rewards for working.

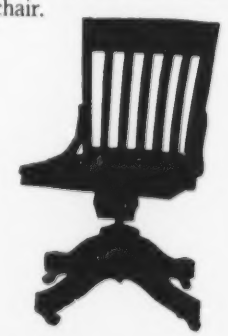
Physically, offices were being "landscaped." No longer cousins to the factory production line, offices became color-coordinated with comfortable and attractive furniture. While executive and upper management offices had always

Chairs

Every desk needs a chair. In the days of scientific management, the chair that went with the clerk's desk had to keep the employee working at maximum productivity. And since clerks were discouraged from leaving their desks, the chair had to keep them sitting. The best-designed chair for desk work was the swivel-based with a wooden saddle seat and slatted wooden back with armrests, based on physiological studies of human anatomy. Many models had adjustable knobs and levers to make the chair fit its occupant. This was the beginning of office ergonomics—the study of design as it relates to human comfort and function. Ergonomics would become a thriving architectural design business in the mid-1970s.

The chair has always been a status symbol in the office. Just as kings sat in thrones and no one else did, employers sat in armchairs while their clerks sat on stools. For all of the sensible comfort of the swivel chair, cane-seated straightbacks implied status in the 1880s. But when the typist's chair evolved into the cushioned armless versions in today's offices, the executive's chair took on kingly dimensions with closed arms, wide seats, and the tallest backrest.

By the 1950s, backrest height and seat size indicated job rank. Just as the bigger the desk the more prestigious the job, the more comfortable-looking the chair was, the higher up the organizational chart was the person who sat in it. There are probably few more powerful symbols in the office and contemporary life than the chair.



Wooden office chair, Shea Smith & Company catalogue. Smithsonian Institution

conveyed the good taste of their inhabitants, general offices now gave out the same message: a clerk who worked in pleasant surroundings was obviously someone enlightened if not culturally superior. For many workers, their office environment was far more luxurious than their homes.

The role of *status* in American culture is a complex topic better treated elsewhere. Within this context it should be recognized, however, that in the booming postwar years Americans were able to fulfill long-held dreams of home ownership, higher education for their children, and the acquisition of objects and symbols of wealth. Factory work with its lower-class or working-class connotations thus became less attractive to many people than the clean, gracious environment of a corporate office.

In the postwar era of change, scientific management was replaced with human relations. Management had discovered from experience that people restricted to their desks doing repetitious tasks became fatigued before the end of the day. By giving workers breaks in their day, more varied work to perform, and coworkers to work with rather than alongside of, they actually became more, not less, productive. People generally no longer just typed or filed all day. If they did, such activity at least took place in a friendly office with plants. The humanitarian style of management worked, and company loyalty and productivity increased.

By the 1960s, most offices were carpeted and relatively well furnished. Some workplaces piped in music; most were softly but effectively lit. Equipment was "the latest," and workers began to see their work as important to the company.

Offices Today

By the 1980s, human relations management has expanded to meet personnel demands. Many companies have accepted the idea that people work to support their personal lives rather than to improve the corporate "bottom line."

What in the 1980s can draw the worker away from his or her office job? A major factor is simply competition. No stigma is attached to frequent job changing, and employees who feel no obligation to the corporation may leave one job for another offering longer vacations or a better profit-sharing plan. In addition, many people realize they can start a small business at home, perhaps doing the same work, like word processing, that they did for the corporation, but on their own schedules and without supervision.

To keep valuable employees, therefore, managers may offer flexible schedules, extended leave policies, and the option of working at home. The theory is that workers whose own needs have been accommodated by their employer are then likely to show increased loyalty to their firm and to work even harder for its success. This kind of favorable exchange reflects successful management strategy and suggests why the railroads invented managers in the first place!

CARBONS TO COMPUTERS:

Office Machines

In the beginning, offices had no machines; all the work was done by hand, with paper, pencil, pen and ink. But the need for fast and efficient communication rapidly grew along with the office. This section focuses on the typewriter and the computer, the machines that advanced office communication and have come to symbolize offices past and present.

The Typewriter

Living in the 1980s, a time when people can "process words," instantly copy them, and even send them elsewhere over the telephone lines, we may find it hard to believe that the forerunner of the word processor, the typewriter, was invented little more than a hundred years ago.

This ubiquitous part of the American office, school, and home den followed a long road to recognition. The typewriter found acceptance only when its promoters finally realized who would be its most likely user. Before that could occur, however, social values that governed personal and professional correspondence had to change to admit the use of a mechanical device in place of the pen.

Remington typewriter, 1878.
Smithsonian Institution

Technology and the Invention of the Typewriter

Practical writing machines became technologically feasible as early as the fourteenth century. The invention of at least 112 such machines preceded the successful Remington typewriter. Many of the early designs received patents, and several were marketed on a limited basis. The first such patent was issued to Henry Mill, an English engineer, in 1714. The first primitive *American* machine was patented in 1829 by William Burt of Detroit. Then in 1868, American inventor Christopher Latham Sholes developed the machine that finally succeeded on the market as the Remington and established the modern idea of the typewriter. Sholes's first try at a type-writing machine was a crude piece of work made with part of an old table, a circular piece of glass, a telegraph key, a piece of carbon paper, and piano wire. This led to an improved prototype resembling a toy piano in appearance, which is now in the Smithsonian's National Museum of American History and is illustrated in the *Carbons to Computers* poster.

Key Points:

- Technology that would have made the invention of the typewriter possible was available 500 years before the typewriter was actually invented.
- The first Remington typewriter was marketed about 150 years after Henry Mill patented a typewriting machine in 1714.
- Christopher Sholes's typewriter did not sell itself but rather required the persuasive marketing talents of James Densmore to even find a manufacturer.
- A strong tradition requiring correspondence to be handwritten was the biggest obstacle to the acceptance of a type-writing machine.
- When the size and number of American businesses grew and principles of standardization and measurable productivity began to govern the office, the typewriter found its audience, and sales skyrocketed.

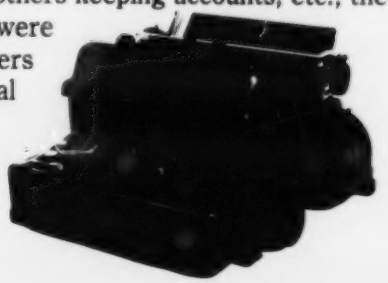
Despite the importance of Sholes's improvements in the machine's mechanical workings over the next several years, the story of the typewriter from 1868 to its booming success in the late 1880s is really the story of its staunchest supporter, James Densmore. Under Densmore's prodding, Sholes improved the first crude machine many times over. Densmore was also responsible for recruiting the machine's first mass manufacturer, E. Remington and Sons, of Ilion, New York, a company that had made armaments during the Civil War and was looking for new products to manufacture.

Finding a Market

The early typewriter's greatest problem was in finding a market. No one knew who would want to buy a typewriter. Sholes thought his most likely customers would be clergymen and men of letters and hoped that interest might then expand to the general public. Neither he nor Densmore saw the obvious utility of the typewriter in business. Sluggish economic conditions in the 1870s were partly responsible for this lack of marketing foresight. Imperfections in the typewriter itself may take another part of the blame. And, as hard as it is to conceive of today, Americans in the 1870s and 1880s were deeply uncomfortable with the strange notion of "mechanical writing." Convention prescribed that all letters be written out in neat longhand, and businessmen enjoyed no exception from this requirement.

The nineteenth-century response to a typewritten letter could have been something like our response to "junk mail"! In addition, typed signatures could be forged. Some accounts tell of recipients who were angered and insulted by typed letters, seeing them as a comment on their inability to read handwriting.

A marketing breakthrough finally occurred with the development of the concept of "scientific management" in the 1880s. With the *specialization of work*—some people doing correspondence, others keeping accounts, etc., the typewriter at last found acceptance. People were ready to give up the old idea of business letters being governed by the same rules as personal letters when business became so big and impersonal that the change was possible.



The first commercial electric typewriter, 1935. International Business Machines Corporation

The Changing Look of the Typewriter

The changing look of the typewriter offers vivid proof that the design of a manufactured object reflects a complex combination of social values, economic needs, and profit-driven motives. Most office equipment before 1940 was overtly mechanical and industrial in appearance. In the difficult economic times of the world depression of the late 1920s and the 1930s, offices had no trouble attracting workers, who would work anywhere, under almost any conditions, and with any equipment. The first changes in typewriter styling actually appeared not in office machines, but in portables, which from the early 1930s were streamlined and offered in color to encourage their use at home.

During the 1950s and 1960s, the entire environment of the office changed along with most office equipment. From about 1950, almost all office typewriter manufacturers presented their machines in colored steel cases that concealed the mechanism and suggested a certain elegance. If secretaries and typists were supposed to be above manual workers, it was important that

Copiers

Today copiers are everywhere, making more copies than anyone needs. Last year Xerox Corporation copied more than 20 million pages just to see if its machines worked.

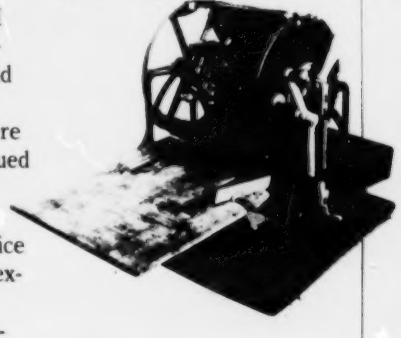
The first method for making a typed copy was carbon paper. Used for little more than credit card receipts today, carbons were once the bane of typists. Messy and unforgiving of mistakes, carbon paper enabled the typist to make a somewhat smeary duplicate of what he or she was typing.

The mimeograph machine of the 1890s, still in use today, particularly in schools, increased the number of copies that could be made from a few to a hundred, using what was known as a "master." But the only way to copy an original after it had been made was to retype, redraw, or rephotograph it.

The photostat machine was developed before World War I, but it was hardly an office tool. It was too expensive, too big, and, requiring a trained operator, too difficult to use.

After World War II, 3M and Eastman Kodak introduced the Thermo-Fax and Verifax copiers into the workplace. The copies were of poor quality and continued to darken long after they had been pulled from the machine. Although the office models were relatively inexpensive and easy to use, their special paper eventually cost users a fortune.

Chester Carlton's discovery of the effect of light in photoconductivity, however, led to the unprecedented success of the "Xerox" machine. The first commercial Xerox machine, the Haloid Xerox 914 of 1960, had defects, such as paper scorching. Nevertheless, today's copiers produce near-perfect images, in color as well, in record time.



Mimeograph machine, A.B. Dick, 1905. Smithsonian Institution

Key Points:

- The appearance of manufactured products does change in response to the development or discovery of new materials, but the strongest influence on the looks and materials used is usually the image the manufacturer wants to create in order to sell the product.
- In its 100-plus years, the office typewriter has had three identifiable "looks" that reflect prevailing social and economic conditions of the time:
  1. A black, metal industrial look, reflecting the similarity of office work to factory work
  2. A sleek, light-colored look that hid and distracted from the mechanical aspects of the machine, reflecting the office's change to a friendly, pleasant, nonindustrial environment
  3. A high-tech look, reflecting society's interest in and approval of advanced technology

typewriters not look like machines but convey a more respectable and less oppressive image.

The electric typewriter helped advance this new image. Although the first electrics were produced in the 1930s, they did not gain wide acceptance until the 1950s.

Today's high-tech design features black finishes on machines, signifying high prestige and sophistication rather than factory conditions. Business machine manufacturers had almost universally stopped using black finishes in the 1950s, but black's recent reappearance for typewriters heralds a new era in office design.

When Is a Machine Obsolete?

Since the 1970s the typewriter has had to compete with the word processor, a clever combination of the typewriter keyboard with the brain of the computer. Word processing lets you make mistakes, correct them, move things around, and change your mind in ways that would require endless retyping on a conventional typewriter.

Yet typewriters still have a place in most homes and offices. Office workers find typewriters faster for typing envelopes and other short jobs. It may be that in ten or twenty years the typewriter will seem quaint and old-fashioned, as carbon paper does today. But many people are quite attached to their typewriters, some even stubbornly holding on to manual machines with the same dedication seen in fountain pen users in this day of the felt tip pen!

Will typewriters have a place in the office of the future? Only time, and people's changing needs and values, will tell. The typewritten rather than word-processed letter may take on a social value about which we can now only speculate. But the typewriter's 100-plus years show that the history of manufactured objects is connected not only to economic history but also to the ideas and images that drive and motivate people in an advanced society.

Electric office typewriter, 1959. International Business Machines Corporation

The Computer

If the typewriter may be considered the symbol of the office in the industrial era, the computer and its desktop terminal represent the office of the postindustrial information age in which we now live. Millions of computers are in use in offices and homes all over the country. To truly understand the history of the computer involves a daunting journey through mathematics, physics, and electrical engineering, through binary math, Boolean algebra, real time, magnetic core memories, floating-point numerical notation, transistors, integrated circuits, and much, much more.

But, ironically, we need to understand none of these things to *use* today's computers and their dazzling array of programs. Programming one of the first computers forty years ago was considered a "one-way ticket to the madhouse." Today learning to use a PC (personal computer) may involve some frustration, but most users spend remarkably few hours in a classroom or with an instruction manual before they are writing letters, juggling figures, and playing games.

What Is a Computer?

Unfortunately, the term is not easy to define because the meaning changes along with the computer's changing capacities. But in its broadest sense a computer is an "information-processing" machine. It can store data—numbers, letters, pictures, or symbols—and manipulate that data according to programs that also have been stored in the machine.

Why Computers?

The first computers were not computers as we define them today. They were calculators—machines to solve mathematical problems, directed every step of the way by the user. The machines were needed simply because working out complex mathematical problems by hand takes extravagant amounts of time. One of the largest mathematical nightmares of the pre-computer age was the tabulating tasks of the U.S. Census Bureau. The headcount itself took only a few months, but the chore of tabulating and analyzing data would take years and by then the data would be useless.

Various experimenters built machines to speed up mathematical work. By 1941 a German engineer who hated engineering's mathematical drudge work had developed fast but limited relay calculating machines that were used in the German war effort.

Military needs in fact have played a major role in the development of the computer. When the United States entered World War II, the Ballistic Research Laboratory (BRL) at Aberdeen Proving Ground had "computers"—one hundred mostly women college graduates with math aptitude who calculated the ballistic firing tables that were used for accurate weapon aiming. Undoubtedly patriotism helped these workers endure: it took about three days to calculate a

single trajectory, and two to four thousand trajectories were needed for each weapon.

But it was not sympathy for the workers that led to the invention of ENIAC (Electronic Numerator, Integrator, Analyzer and Computer), but rather their inability to compute as quickly as the Army required. The Army's pressing need led to financial support for the development of this huge machine, 8 feet high, 80 feet long, and weighing 30 tons. Thousands of times faster than any of its predecessors, it was completed in November 1945.

ENIAC demonstrated the unmistakable advantages of machine computing. The first commercial computer system in America soon followed. It was the UNIVAC, sold in the 1950s. Office workers became accustomed to the separate areas of their companies that housed the huge new machines and the programmers and technicians who knew how to use them. Data processing departments became commonplace.

Working with Computers

As their capacities increased from handling only mathematical computations to manipulating words and other forms of data, computers began to change how many businesses did their work. Crews of mostly female keypunch operators, who put data into machine-usable form, became a new class of unskilled labor. Managers encountered another combatant in the corporate power struggle—the data processing manager—who controlled when their computing would be done. But for most office workers, the computer remained the huge alien in a cold room in another part of the building.

Technological advances made computers smaller, faster, and extremely capable information handlers, but not any more "friendly" or comprehensible to the ordinary person who was likely to be afraid of them.

By the 1970s integrated circuit technology made a small and inexpensive personal computer possible. Many computer companies could have developed one. But the computer companies could not imagine why anyone would want a computer. Typewriters and calculators are adequate for almost any nontechnical person's work.

The Personal Computer

PCs were developed not by big corporations but by electronics buffs—the man or woman who read about computers, sent away for instructions and materials, and built one in the basement. Probably one or two thousand computers were built from a July 1974 magazine article and its mail order instructions.

In the early 1970s a college dropout, self-taught engineer in his twenties, Stephen G. Wozniak, met a teenager named Steven P. Jobs. Their love for computing and computer games led them to found the Apple Computer Company, in 1977 the fastest-growing company in American history. They made an af-

Key Points:

- The computer symbolizes the office of the post-industrial information age in which we now live.
- The first computers were calculators, machines designed to speed the solution of complex and lengthy mathematical problems.
- Military needs have played a major role in the development of the computer, which replaced human "computers" who lacked the speed the Army required.
- The first commercial computer system in America was the UNIVAC, sold in the 1950s.
- Personal computers (PCs) were developed not by big corporations but by electronics buffs.

fordable computer almost anyone could use. Their success undoubtedly led companies to see computers as tools for everyone's desk top.

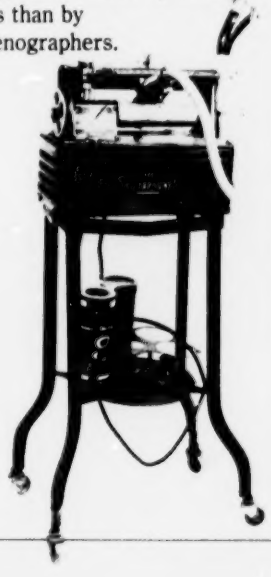
Understanding and knowing how to program a computer are, for most people, irrelevant today because thousands of inexpensive programs (software) are available. Using built-in rules and procedures, these programs offer fast and efficient ways to do common office tasks like spreadsheets and word processing. Office workers can write, store, and share huge amounts of information without leaving their desks or workstations. At the time of this writing, some of the latest developments in office software are programs that give the individual user "increased access." This means not only increased ability to obtain data but easier methods for categorizing, linking, and manipulating it. These programs enable office workers to write proposals together, send messages to each other, and coordinate their schedules. These developments have changed the computer from a forbidding guardian of knowledge to a useful tool and a powerful communicator.

Dictating Machine

The dictating machine is yet another example of the complex relationship between technological development and what people need and want. Thomas Edison's early phonograph, while a terrific idea, had dreadful sound, as well as a limited number of prerecorded wax discs (records) to play, and it wasn't selling well. The marketers of the phonograph thought to sell it to offices as a dictating machine, but it failed there as well. Stenographers hated it, and it was expensive. By the 1890s, it was already off the market. The phonograph, with critical technical improvements in recording quality, went on to achieve singular success.

Scientific management in its heyday, however, liked the dictating machine. It believed that not only would dictating letters into a machine cut the cost of producing a letter from 4.3 cents to 2.7 cents, but that the dictating machine could make the executive more creative. "Men who formerly dictated stilted letters have been taught by the dictating machine to express themselves lucidly," suggested one source. What scientific management was really trying to avoid was wasted time when the "dictator and stenographer engage in conversation entirely unconnected with the business at hand."

Some offices did use dictaphones, but most didn't. They were still cumbersome, intimidating, and poor recording machines. It took magnetic tape in the 1950s to make dictating practical. Dictating letters and memos and bright ideas into tape recorders, in cars as well as in executive suites, became standard office operating procedure that continues today, valued more by managers than by stenographers.



Dictaphone machine made by Columbia Graphaphone, ca. 1903. Smithsonian Institution

Office Organization

Most observers agree that offices are not egalitarian. Someone is at the top, someone else is on the bottom. Various utopian experiments and communal organizations do exist on the periphery of American business, and some are successful. But the overwhelming majority of corporate structures in this country are built hierarchically, with top management, middle management, and support staff.

Some businesses are organized somewhat differently. Professional partnerships like law firms and medical practices, for example, have no investors; the partners share equal power, equal decision-making authority, and equal access to the profits. A small professional office of this type may have no middle management, just the partners and their support staff.

Larger organizations usually have one person at the top, the president or chief executive officer, who reports directly to the board of directors (the investors or persons who represent the investors). These top managers usually depend on middle managers for two main reasons. The business is too large for one person or group to manage directly, and a large business is so complex as to require people with specialized skills or areas of expertise to run various departments.

A company that manufactures a product, for example, would require a chief financial officer to control payroll, ordering and paying for parts, sending bills and recording payments, and maintaining records for auditing and tax purposes. The company would also require a chief engineer—a technical expert in the company's line of business. The business would require shipping and receiving departments and people to head them. Someone would have to supervise all of the factory workers, train them, give them work assignments, monitor their comings and goings, and check the quality of their work. As the company grew in size, this would be too big a job for one person: another engineer could be responsible only for quality control. Breaking down work into smaller jobs is called *specialization*—which is characteristic of work and business in industrial and postindustrial societies.

Status

Sociologists have long observed the connection between the design of environments and the power relations that determine what goes on there. Whether an office, a factory, or a prison, physical characteristics can tell us who is powerful, who is not; who watches, who is watched; who dictates, who takes dictation.

Even as the nobility and high clergy in feudal Europe, for example, marked their elevated status with their clothing and surroundings, so too twentieth-century culture makes such distinctions. From its beginnings, the office reflected the unequal status of its occupants. Almost anything inside an office can be made bigger, smaller, more expensively, or less expensively than anything else. In the same way, the feudal lord's robes often took hundreds more yards

of fabric than the simple garb of the peasant who served him.

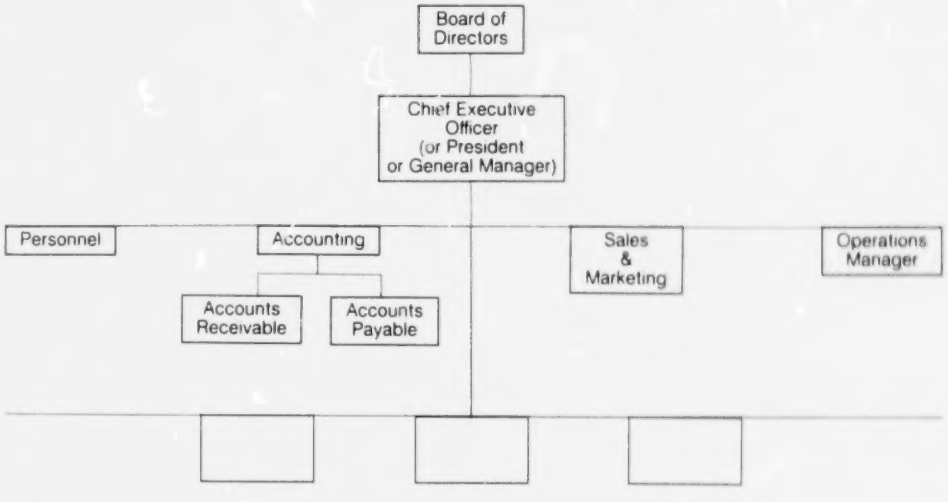
Offices reflect status in many ways, including the following:

- size of the office itself, number of windows, top floor or lower floor in the building
- carpeted or uncarpeted floors, cost of the carpeting; hardwood floors with oriental rugs versus broadloom carpeting
- size of desk, hardwoods versus veneers and plastics or metal; lock on desk
- "executive washroom" or dining area, that is, private areas and services for some members of the hierarchy, not others
- chairs, comfortable, with arms and cushions, versus plain woods, or designed to look like home furniture versus functional—meant to promote comfort for the sake of efficiency
- privacy itself—the executive suite, guarded by a personal secretary who admits or denies admittance to visitors, versus shared open space, no locks on desks, no personal phones
- works of art on walls versus plain walls, wallpaper or wood paneling versus paint, metal or fabric partitions

These are some of the ways in which organizations visually and physically represent the intangible relations of power and authority in the office. The photographs in this kit illustrate others.

Typical office organization shows three levels of management under the board of directors: a chief executive officer, a tier of middle managers, and a tier of supervisors. Actual businesses show great variety in job titles and functions within this basic structure.

Organization Chart



Office Workers

IBM product brochure, 1959. International Business Machines Corporation

A high school student today may have had the experience of being greeted by a male receptionist or served by a female bank executive. Despite the many gains of the women's movement, however, it can be argued that the sex-typing of jobs is nearly as strong today as it ever was.

Sex-typing of jobs simply means that jobs are constructed as either men's jobs or women's jobs. And although there have always been exceptions, most women work in women's jobs, most men in men's jobs.

It is important to understand that sex-typing is largely culturally determined—that is, our social values indicate that one sex is better suited to a kind of work than is the other. Before the industrial revolution, women worked in the home and men held essentially all jobs outside the home. Note that our earlier discussions about the first (railroad) offices referred only to men. The modern office reflects a completely different perspective, but one that nonetheless retains the element of sex-typing.

In business of the 1980s, who actually makes the decision that sex-types a job—the employer in writing the job description or the people who apply for the job? Does a job start out sex-typed, or does it evolve that way?

The answers to these questions are complex and, as of 1989, still not completely answerable. Research reports that seem to prove men or women biologically better at one thing or another, at one time of the month or another, still make the front page. That *some* division of work has been based on men's and women's differing physical size and strength seems irrefutable.

But office work requires no physical strength. Something else must explain why men have been the bosses, the managers, the administrators, and women the secretaries, the file clerks, the receptionists. The issues involved in explaining women's place in the work force of the past 150 years can only be described here, not analyzed and explained.

Clerical jobs were developed for women in offices in the late nineteenth century. Since that time, these jobs have not only grown in number but have become more feminized as well.

The first clerical workers were men. Early clerical work was seen as a craft, developed to help business owners keep current records of their enterprises and to maintain relations with the outside world. Apprentices or journeymen craftsmen learned their crafts from master bookkeepers or chief clerks then advanced in the business by promotion. Since clerks often rose into management positions, owners tended to fill these entry-level slots with male family members.

As the office developed in complexity and size, clerical work was mechanized. The skills required to operate a typewriter or take stenography differed increasingly from those required of managers. Women were brought into offices to fill these new "clerical" positions, with firms taking advantage of the supply of middle-class, high school or college-educated women who would work for lower wages than men of comparable education. As women were drawn into clerical work, the jobs' contents changed. The previously masculine job of

clerk, the first step on the ladder to a management position, was transformed into a permanently subordinate, and hence feminine, job.

As we approach the end of the twentieth century, many women have advanced from secretarial jobs to management positions by talent, hard work, and determination. It is fair to say, however, that most clerical positions remain "permanently subordinated." But this is not to say that nothing has changed.

A major difference in today's work world from that of our grandparents and great-grandparents is that women are not limited to a choice between clerical and factory work if they are without education or skills, and between teaching and nursing if they have advanced education. Both men and women work in virtually all the professions, although the trades and clerical positions remain highly sex-typed.

But again, these changes do not mean that being a man or a woman has no bearing on the kind of work a person will do. When we recall that the overwhelming majority of all professional positions were held by men at the beginning of the twentieth century, women's current career success represents their clear and steady progression into men's jobs. We do not see a similar rush by men to women's jobs, however. "Men's jobs" remain the favored choice.

No one could say with certainty which jobs will be held by men, which by women, fifty years from now. We probably are unable to imagine what the jobs will be, given the rapid pace of technological change in modern life, let alone who will hold them. But certain factors need to be considered when thinking about work in the future.

- Technological advances bring changes to the occupational opportunities available to men and women. For example, many professionals now work without secretarial support, using their own computers with word processing capabilities to write correspondence and reports, using the computer to file information that formerly would have had to be stored in a filing cabinet. Telephone answering machines and services already replace receptionists and personal secretaries for many people. These factors would tend to change or affect the traditional hierarchies of offices.
- Subordinate work or support work will always be attractive to some segment of the population, if only at certain times in their working lives. Some women will continue to choose family over career, at least for a number of years. Many people work more than one job, or work while preparing for another career, and are attracted to support positions. And as the population ages, former careerists may choose to supplement pensions or augment volunteer work with part-time or temporary jobs. These millions of workers would tend to support the continuance of "noncareer" jobs in the corporate or office structure.
- Finally, not everyone can be the boss or a professional, nor do they want to be. If everyone could be in charge, managers would have nobody to manage.

Office Trends

For several years Americans have been reading and hearing that ours is a postindustrial information society. Most people will spend their working lives not making products but rather providing services or expertise. Unskilled laborers today are likely to work in fast food chain restaurants rather than in factories; many highly educated professionals now work as consultants, selling no product other than their knowledge. Old and familiar kinds of work are being done in new ways. Doctors and nurses, for example, use computers in diagnosis, patient monitoring, record keeping, and other applications.

It stands to reason then that trends in office technology will focus on generating, storing, and communicating information in quicker, safer, cheaper, better ways.

Facsimile (fax)

Facsimile is today's fastest-growing area of office automation and business communication. To the nontechnical observer, the fax machine seems to send a photocopy to another fax machine over the telephone lines: you dial a number, place the pages you want to send in the machine, press "start," and off they go, at about a minute a page.

Long before photocopying machines, the facsimile machine was invented in 1842 by Alexander Bain, a Scottish clockmaker, who used clock mechanisms to transfer an image from one sheet of electrically conductive paper to another. Bain patented the "automatic electrochemical recording telegraph" in 1843.

Various machines using Bain's technology have been in use for many years. In 1934 the Associated Press began to use "wirephoto" to transmit photographs. But then television brought a news revolution—people could see live or same-day footage of events rather than one or two photographs.

Only today has "fax" become a household word. The current facsimile revolution has come about because of *digital technology* (the same technology that lets us play video games), which has increased the speed, compactness, and reliability of the machines, as well as brought down prices. And, like Sholes's typewriter, this technology has found its real market in the business world, where efficiency and fast communication have been necessary since the days of the railroads. Fax machines make it possible to send anything that can be printed on a page to anywhere in the world in not much more time than it would take to hand the page to someone across the top of your desk.

High Security Office

Some information stored in computer databases is invaluable—to national security or to huge multinational corporations that do billions of dollars of business annually. As data managers must protect information against theft and sabotage, sensitive compartmentalized information facilities (SCIFs), vaulted rooms and buildings that are impossible to break into, wiretap, or eavesdrop on, have been built. Their walls are soundproofed and shielded from radio frequencies. Their computer systems are closed circuit and video monitored. Entrance is gained by voice or thumbprint and access cards, in some cases through armed guards. The SCIFs of the future, like those today, will daily change their technological operations to maintain a lock on their information.

Offices are not immune from the "snooping" we guard against in our homes. Discarded documents in the office can leave us vulnerable: even maintenance people have been caught selling trash to their employer's competitors. For many companies, consequently, the paper shredder has become as necessary as the copying machine.

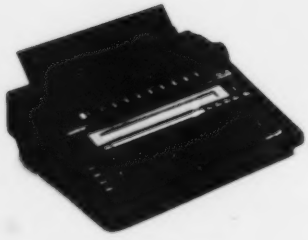
Office Landscape

Along with all the changes in the looks of machines and furniture in the postwar years, the arrangement of space itself changed. Offices were transformed from factory lookalikes to landscapes of fine furniture, carpeting, potted plants, soft lighting, and attractive artwork. This was part of management's attempt to lure workers.

In the 1960s and 1970s offices reflected the same social changes that were turning rows of desks in schools into "open classrooms" and "schools without walls." In these years of questioning of authority and tradition, managers and subordinates worked side by side at desks that were almost the same. The manager's, of course, was larger.

Yet it was the need for visible hierarchies that introduced screen-mounted furniture in the 1960s. Open offices were broken into partitioned cubicles as a new group of high-status, nonmanagement workers came to work—the computer professionals. The partitions, often with desks and filing systems attached, visually reestablished by size and location the office's ranking system.

As downtown offices became more and more expensive to lease, general office furniture has become smaller to maximize space. Many furniture designers have developed plastic systems of furniture that can grow when needed. These systems make the metal functional desks of the 1920s look fancy.



Electronic typewriter, 1989. Brother International Corporation

New Technology

Offices are changing most rapidly, however, at the other end of the spectrum—developing better, faster, cheaper access to information. Facsimile (fax) machines, high-speed copiers, local area computer networks, upgraded personal computers (PCs) with increased data storage capacity, microfilm records systems—these interest office managers today.

Such lists, however, foster the misconception that technology itself brings social change. That is no more true today than it was at the time of Sholes's invention of the typewriter. Technological advances may be developed by scientists or inventors who only dimly imagine the potential uses of their work. The needs of government, business, and individuals combine to bring about the practical applications of technology. The growth of the "global office" illustrates this point.

The Global Office

The New York Life Insurance Company operates such a facility in the rural Irish market village of Castleisland. Because it was having trouble finding enough skilled workers to process insurance claims in the United States, New York Life is now doing such work in Ireland, using a computer link to its processing center in New Jersey.

Recent improvements in telecommunications and computer technology have allowed many office jobs to be performed thousands of miles away from their point of origin. Manufacturing industries have been using cheaper labor abroad for more than a decade.

The reasons compelling corporations to send white-collar work abroad go well beyond simple wage benefits. Recruiting workers for low-level jobs like claims processing has become more and more difficult in this country, and turnover among claims workers runs as high as 30 percent a year. Changing demographics will decrease the number of 18-to-24-year-olds in the American work force by 17.5 percent in the decade ending in 1995, significantly diminishing the likely labor pool for such jobs.

Balancing technological advances and demographic trends in the New York Life experiment, however, is the human factor. Corporate executives have reportedly found it difficult to relinquish their traditional view that unless workers are under the boss's eye, efficiency suffers.

The Portable Office

For several years it has been possible for an office to extend beyond the walls of one building to various locations around a city or region. Car telephones, only a few years ago extravagant "toys," now enable the office to move around with the office worker. Automobile fax machines also are available, as are portable computer keyboards. The image of the executive behind a big desk in a huge office may not be extinct, but it must be augmented by the man or woman constantly on the move.

The Home Office

A more settled office alternative is the home office. Reasonably priced portable office equipment and advanced communications technology make it possible for people to do anything in their homes that once required a corporate office. Some people run their own businesses from home, others work for a company using computer networks and fax to communicate with the main office. Although the interaction of people working together in one place retains its attractions and benefits, consultants, mothers of young children, disabled people, part-time workers, and many others find a home office better suited to their personal needs.

EM 2050-D Electronic typing system, 1989. Brother International Corporation

The Future

Reasonable projections from the present suggest that the office of the future will employ sophisticated means of virtually instantaneous communication. Industry experts predict that a forthcoming multipurpose office machine may combine computer, word processor, telephone, facsimile machine, and copier. Two people in different cities could have a telephone conversation in which they work out problems together over a computer network and transmit documents back and forth to each other, at much lower cost and in far less time than traveling, mailing, using courier, or any other current technology now permits. Each person would need only one piece of equipment—presumably affordable because so many would be in use as to bring down costs.

What would such technology likely mean to the individual human being who sits at his or her multipurpose terminal? Some people speculate that each worker will be "the master of his own fate"—able to get, give, and create information independently of anyone else. What would the "manager" of such a worker have to manage? And what change would this bring to the organization chart ten years hence?

There is every indication that people will remain as recognizably human, fallible, and quirky as ever. We expect them to continue using technology to advance their own interests and needs, as well as fulfill the corporation's drive for increased profit and success. Only future historians will be able to assess the true compatibility of humanity with technology. For the present, we can but work—and dream.

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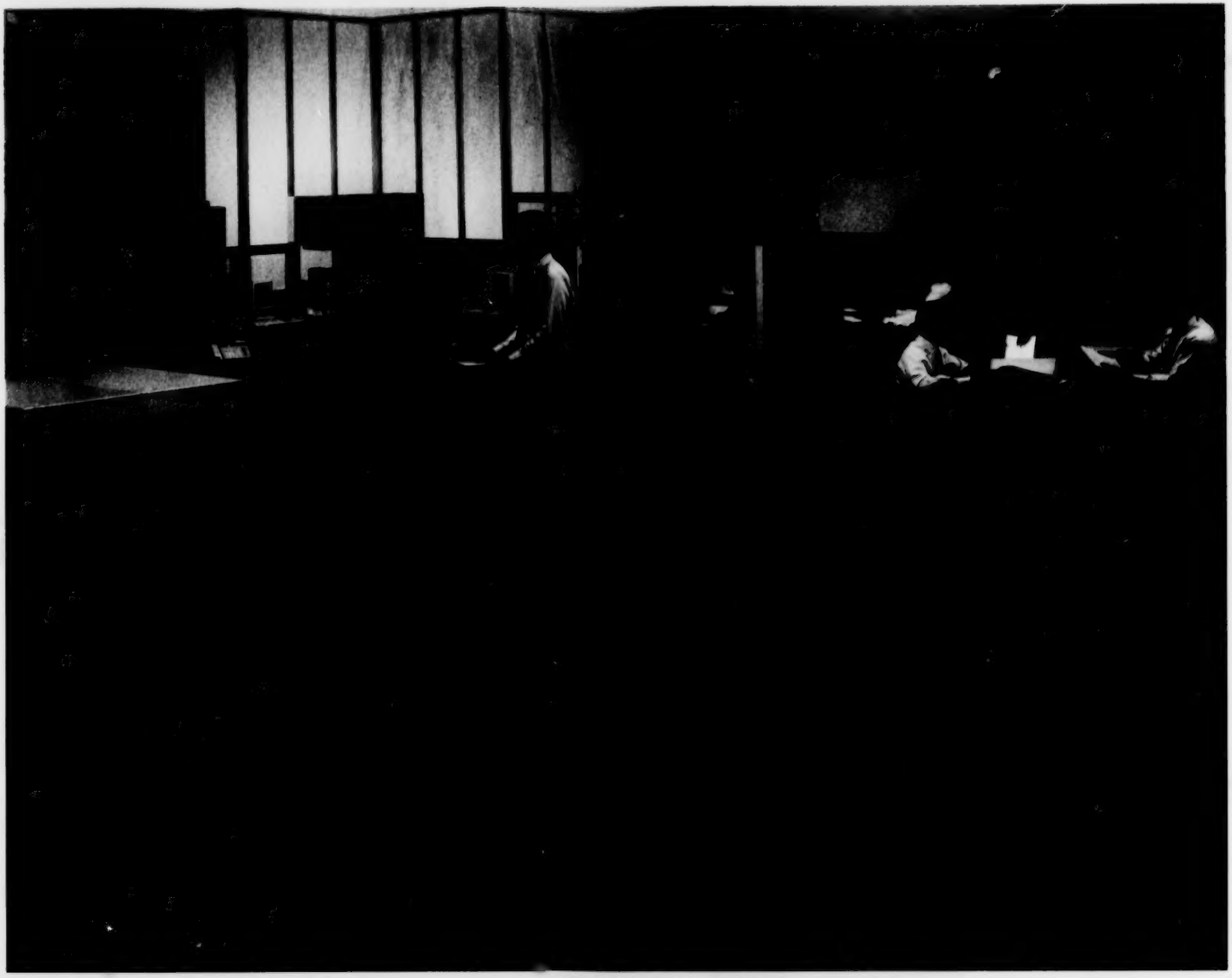

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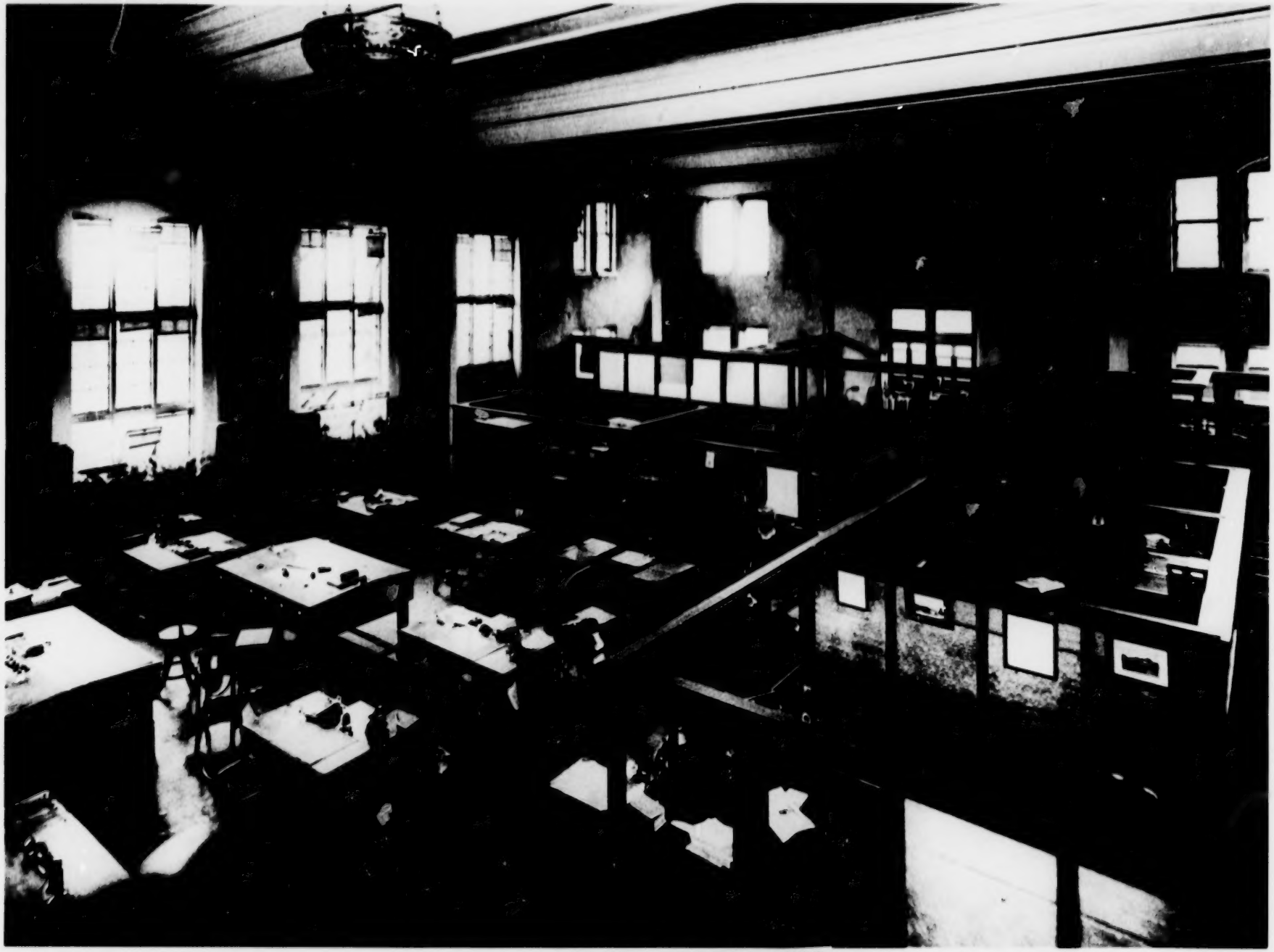

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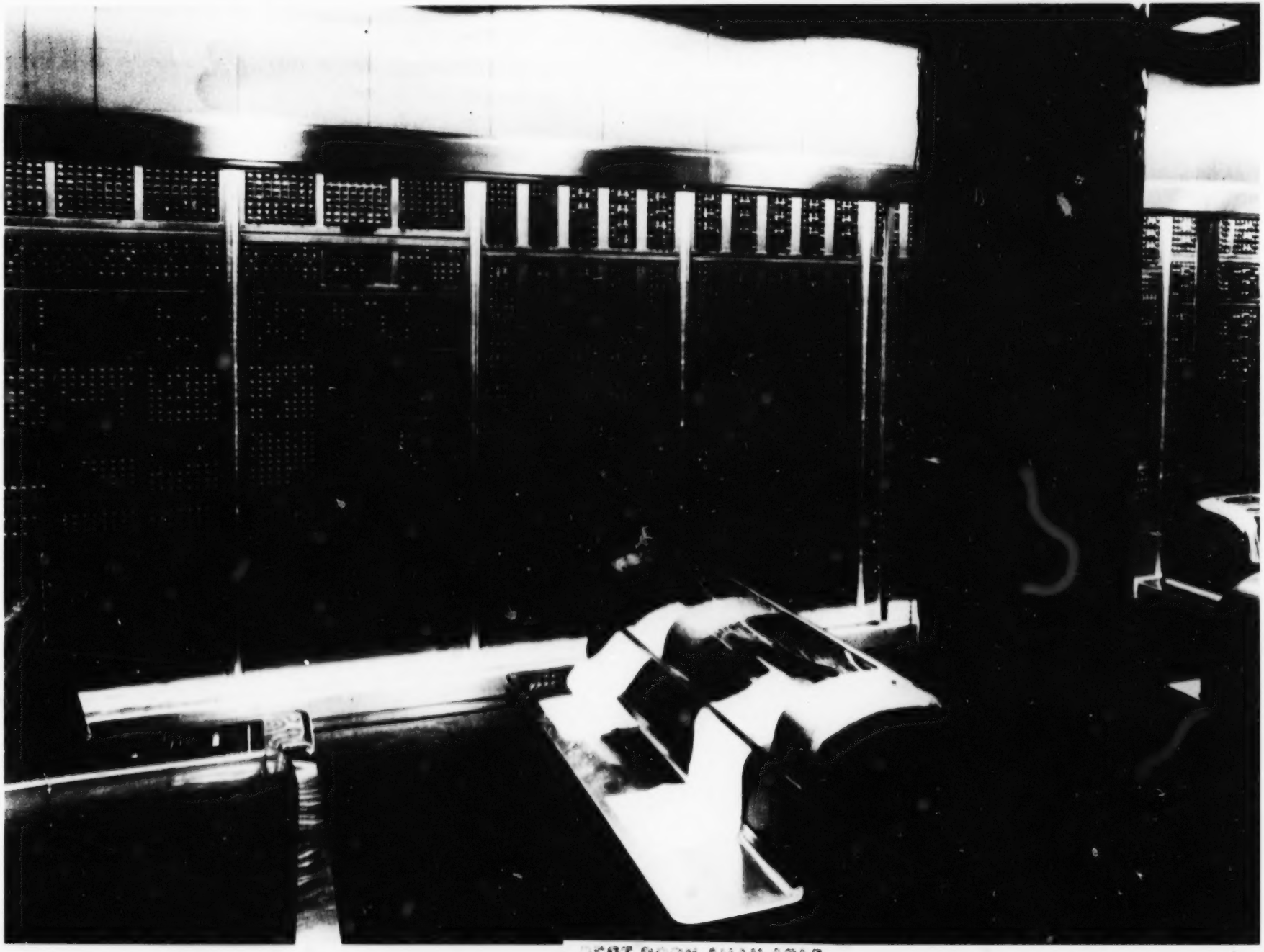

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CARBONS TO COMPUTERS

Teacher's Guide

The Changing American Office

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CARBONS TO COMPUTERS

Teacher's Guide

The Changing American Office

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Why Study Offices?

A time-honored justification for the teaching of history is that the study of the past informs our experience of the present; that we cannot understand the time in which we live if we do not understand the events, decisions, and people who came before us. But it is difficult to make the past live. Teachers, historians, and museum professionals continually struggle to show the past as it might have been without making it seem disconnected from and irrelevant to the present.

The materials in *Carbons to Computers: The Changing American Office* explore a contemporary phenomenon that has strong ties to its past. The high-tech American office of today is more similar to than different from its predecessors twenty, fifty, or a hundred years ago. People still sit at desks and need something to write with and a place to store what they have written. A floppy disk is just a small-scale filing cabinet. Subtler continuities exist between office organization and management, past and present.

We can observe and examine what is left of the offices of the past in museums, in photographs, and in the remembrances of people who have worked in offices. We can also connect past to present and test our opinions and beliefs by visiting and thinking about living, working offices as they are today.

Offices also provide rich opportunities to consider how inventions and technological changes come about and how they affect daily life. Again, surprising parallels occur between past and present.

Furthermore, these fresh and exciting concepts are not isolated from the traditional social studies curriculum. Rather, *Carbons to Computers* can enrich students' understanding of several familiar themes: trade and commerce; economics; the industrial revolution; work; women's roles; technology; inventions; power; beliefs and customs; capitalism; postindustrial economy; reform movements; and change.

The essay booklet in this kit has been designed to be used as either teacher's background or student reading. Complex and challenging ideas are presented in lively, readable sections reinforced by "Key Points" outlines. Major emphases include:

- defining the office
- economic, social, and political influences
- machines, equipment, and change
- organization and status
- workers
- trends

Although these materials have been designed primarily to be used in conjunction with the history curriculum, they can provide enriching experiences for business teachers and students as well.

Carbons to Computers: The Changing American Office also offers a lesson plan that introduces students to methods of historical research. "How to Use *Carbons to Computers*," which follows this section, describes the lesson plan in detail.

Student Activities

Objectives:

Activity 1—developing observation skills
Activity 2—organizing and processing observed data; raising questions for further research; ordering elements in historical sequence; making interpretations
Activity 3—interviewing—information-gathering techniques; logically organizing data; summarizing results
Activity 4—creating a historical record: collecting, organizing, and analyzing information and making projections and predictions

Activity 1

Objective: To gather and classify information from observation of photographs; to have students differentiate between fact and inference.

First Part

1. Divide the class into small groups of four or five.
2. Give each group a different photograph and a blank piece of paper.
3. Give each group four minutes (carefully timed) in which to record as much information as possible about the photograph. Suggest that students try to identify the pieces of furniture, kinds of equipment, clues as to the kind of business conducted, number of men and women, whether supervisors are present and how they can be identified, and other observations pertinent to the topic of office work.
4. When time is up, have each group pass its photograph and paper to the next group and receive a new one.
5. Have each group repeat the process with the new photograph, adding only *new* information.
6. Continue this rotation until each group has seen and recorded information about each photograph.

Second Part

1. Give each group its original photograph and now-completed paper.
2. Discuss, as a class, information obtained by observation. Using the blackboard, classify the information into *fact* and *inference*. For example, that women are in the photographs is fact; that the women are secretaries is inference.
3. Draw up a list of possible sources one would use to substantiate the inferences, such as newspaper articles, interviews, and company archives.

Activity 2

Objective: To organize information obtained by observation and order it in historical sequence; to use evidence to support hypotheses. To discuss, analyze, and interpret information.

1. A few days before conducting this activity assign the reading in *Carbons to Computers: The Changing American Office.* This may be accomplished in one of the following ways: 1)put the booklet on reserve in the school library; 2) make photocopies of the material and distribute them to the class or to groups; or 3) assign groups to read subsections of the booklet.
2. Using all fifteen photographs enclosed in the kit folder, have students arrange them in historical sequence, earliest to most recent. Alert students that some of the photographs were taken in the same year or few years.
3. In class discussion have students explain and defend their choices, *citing evidence* in the photographs and from their reading.
4. Confirm the correct order of photographs using the chart below and discuss any discrepancies between students' choices and the available evidence.

Photograph number	Year of photograph
4	ca. 1898
14	1916
3	1916
9	1928
15	1931
13	1939
11	1948
12	1948
1	1949
5	1953
8	1955
7	1957
6	1987
10	1988
2	1988

5. *Discussion topics.* Choose three or four of the photographs to use as the basis for a discussion of topics examined in the *Carbons to Computers* booklet. Some themes to consider:
   - power relations in the office
   - women's work
   - status symbols in offices
   - evidence of personal expression in the office or its absence
   - relationships between supervisors and workers (as indicated by the arrangement of people, furniture, and equipment)
   - continuities between past and present
   - change from past to present

Activity 3

Objective: To develop interviewing techniques—organize ideas and materials; record and summarize data; develop hypotheses about information collected; present results.

The photographs provided in this kit offer many views of office life in the past and present, but artifacts and images can tell only part of any story. In the following activity, students employ a research method used by historians: the interview. Explain to the class that the interview is a living primary source of information.

The purpose of the students' interviews will be to gather information about work and conditions in offices over the past several years. The activity will culminate in students' writing a two-page summary of their interviews. Recommend that students find people to interview who have worked in offices for at least fifteen years, preferably longer. Retired persons who would have worked during the Second World War, perhaps into the 1970s, would be ideal candidates for interviews. Other potential subjects would be the school's business course instructors. Instructors would have knowledge of changes in machinery and equipment, necessary skills for office workers, changing proportions of girls to boys in their classes, career aspirations and achievements of their graduates, and much more.

To prepare for the interviews, give each student a photocopy of the Interview Worksheet and the Interview Checklist. In class, discuss possible additions to these lists and stress the lists' importance in organizing and completing successful interviews. Because interviews often generate more interesting information than can be presented in the interviewer's two-page summary, students will need to select and organize their findings with great care.

Interview Checklist

- ☐ *Identify potential interview subjects:* parents and relatives, their business associates and friends; business course instructors; your own employers or co-workers.

- ☐ *Prepare questions:* Identify the goals of the interview. What do you want to discover? Refer to Interview Worksheet—review questions. Jot down others based on what you already know about the person you are interviewing.

- ☐ *Prepare equipment:* tape recorder, two hours of blank tape, camera, flashes, fresh batteries, notebook, pen or pencil. Make sure equipment works.

- ☐ *Rehearse:* Spend at least ten minutes rehearsing what you will say; work with other students. If some class members have previously conducted interviews (for the school newspaper, for example), ask them for advice.

- ☐ *Make arrangements:* Call or write potential subjects to ask for an hour for the interview. Set a specific time and place; confirm the appointment on the preceding day. Be on time.

- ☐ *Extend thanks:* Thank family members and friends who agreed to be interviewed at the close of the interview. Send a brief thank-you note for their time and information to other people interviewed.

Interview Worksheet

Interviewer: _____

Person interviewed: _____

Current position of person interviewed: _____

Date and place of interview: _____

Facts and chronology of person's work history, such as:

First (and subsequent) office job? _____

_____

Kind of work done? _____

Job titles held? _____

General questions on office work:
Describe the work day, office procedures, and general conditions of the work. How did these things change from one job to the next, between one employer and another?

What were the machines, equipment, and furnishings like at the first job? How did these things change over the years?

Describe the physical layout of the office and the relationships between management, nonmanagement employees, and equipment.

Were co-workers men or women? What jobs did men and women hold? Did patterns change over time?

Additional questions: (use second sheet)

Activity 4

Objective: To collect, organize, and analyze primary and secondary source information that documents a local office. (Students will synthesize what they have learned to predict the office's organization and functions in the year 2000.)

The preceding activities have helped your students recognize the significance of evidence in interpreting and understanding history. In this activity, the students will conduct research to create a historical record, interpret the evidence they find, and extrapolate from it to make projections about the future. Like curators in museums, the students will observe and collect objects and try to interpret their meanings based on available evidence.

Small groups of three or four students will take field trips to visit offices in their community. Using the Research Checklist on the following page as a guide, students should prepare for the trips by obtaining materials from the company and writing interview worksheets like the one supplied in activity 3. On the field trip, teams of students will conduct two formal interviews as well as informally question other people. They will also sketch the physical layout of the office and its contents. Later they will write summaries of the interviews, project how they think the company they visited will change in ten years, and write an essay (of about 500 words) explaining their projections. Their final presentation should include a set of materials documenting the company as it is today, a complementary set of materials depicting the company in the year 2000, and the explanatory essay. For example, using sketches and typed copy or a word processor, students may prepare a product brochure like the actual brochure obtained from the company, describing its products in the year 2000. The interview summaries will describe an imaginary manager and subordinate in 2000, and so on.

Selection of site visits should receive careful consideration. Small offices may be easier to sketch and inventory than large ones; they may also be less interesting. On the other hand, a very large office may simply exceed the limits of feasible investigation. Students may find that focusing on one department or manageable work area within a larger entity will offer the best opportunity for research.

Assigning the Project

1. Organize the class into small groups of at least three but not more than four students.
2. Give each group two or three days to decide on a company or organization to visit. The students' interviews in activity 3 may have identified some local offices; or they may wish to use the telephone book or a local chamber of commerce listing of local businesses for addresses and telephone numbers. Suggest that each group determine its scheduling and transportation needs. As most offices conduct business until 5 or 6 p.m., the field trip can be fit in after school.
3. Have each group organize itself as a research team based on the information they need to obtain (as described in the Research Checklist). Two students may be responsible for interviewing, one for obtaining company literature and writing up the essay, another for sketching the layout or preparing the inventory.
4. Set aside class time or suggest that students arrange time to work on their presentation following the field trip. Set a deadline for completion of the field trip and submission of documentary and written materials.
5. Make photocopies of the Research Checklist for each group. Allow class time for students to ask questions and do preliminary planning.

Research Checklist

Obtain the following materials from the company or organization visited:

☐ **1. Company literature**
Before visiting the office, ask the contact person for copies of a product brochure, a capability statement, or, if neither is available, advertising copy. Read the material before the visit and select the item that best represents the office to use in the final presentation.

☐ **2. Floor plan**
Before visiting the office, ask the contact person for a copy of a floor plan of the primary work area. If one is not available, sketch it during the visit. The plan need not be drawn to scale or artistically rendered, but it must show the following: management offices, nonmanagement employees' offices, and equipment or furnishings as they seem necessary to describe the workings of the office, for example, privacy partitions, desks or workstations, and computers.

☐ **3. Inventory**
Compile a list of the office's furnishings and equipment. Categorize the data into "essential" equipment, furniture, and "personal and decorative" items.

☐ **4. Organization chart**
Using the sample organization chart in the *Carbons to Computers* booklet as a guide, draw a chart showing the management structure of the organization visited.

☐ **5. Interviews**
Conduct two 30-minute interviews with a manager or supervisor and a person who works for him or her. Write two two-page summaries of the interviews.

Captions and Credits

1. Burroughs Sensimatic accounting machines were popular in the 1950s. Courtesy Unisys Archives
2. Modular office of the 1980s featuring Unisys U series information systems. Courtesy Unisys Archives
3. Main office of the Warner Company, Wilmington, Delaware, 1916. Courtesy Hagley Museum and Library
4. Postal workers, Washington, D.C., ca. 1898. Photo National Archives, courtesy National Park Service
5. Typical office setting, ca. 1953. Courtesy AEtna Life & Casualty Archives
6. Computer office system, 1987. Courtesy International Business Machines Corporation
7. IBM 709 data processing system, 1957. Courtesy International Business Machines Corporation
8. Corporate president's office, 1955. Courtesy AEtna Life & Casualty Archives
9. Pullman Company, shop office, 1928. Courtesy Hagley Museum and Library
10. IBM personal computer, 1988. Courtesy International Business Machines Corporation
11. Typical office setting, 1948. The calculator and typewriters were manufactured by Burroughs Adding Machine Company. Courtesy Unisys Archives
12. IBM Selective Sequential Controlled Calculator, 1948. Courtesy International Business Machines Corporation
13. A typing pool, 1939. Courtesy International Business Machines Corporation
14. Government office filing room, 1916. Photo National Archives
15. Corporate vice president's office, 1931. Courtesy AEtna Life & Casualty Archives

Photographs on *Carbons to Computers* cover:
Top, Christopher Sholes's patent model, 1868. Smithsonian Institution
Top left, Sholes and Glidden typewriter, 1873. Smithsonian Institution
Top right, Remington typewriter, 1878. Smithsonian Institution
Bottom left, IBM electronic 60 typewriter, ca. 1970. Courtesy International Business Machines Corporation
Bottom right, Brother typing system, 1989. Courtesy Brother International Corporation